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NEW SPECIES OF CERATOPOGON.¹

WILLIAM HENRY LONG, JR.

The family Chironomidæ has been much neglected by dipterologists, notwithstanding the number and diversity of its species. Even the larval forms which are especially interesting have not, as yet, received as much study as they deserve. The writer's attention was first directed to this family by finding the larvæ of a species of *Ceratopogon* in large numbers in the vicinity of Austin, Texas, during the winter months. Certain peculiarities of its development induced him to extend his study to other species of *Ceratopogon* in the same vicinity. This study brought to light several interesting facts, some of which may prove of value in separating the species of this large and complex genus. Two of the species included in this article seem to be myrmecophilous, the first, it seems, to be recorded from America.

CERATOPOGON BRUMALIS, sp. nov.

♂, length 3 mm., wing $2 \times .5$ mm.; ♀, length 2.5 mm., wing $2 \times .75$ mm. Two subcostal cells; third or cubital vein terminating distinctly before the middle of the wing with a white spot at apex of costal vein; wings and entire insect densely pilose; halteres white; metatarsi equaling or slightly shorter than the following joint; tibia of female with black lanceolate scales; last four joints of the male's antennæ longer than the basal ten joints; eleventh about 1.5 times as long as any succeeding joint. Antennæ not longer than mesonotum.

♀, head piceous; pile on tips of antennæ and palpi whitish; joints 2-9 of antennæ ovate subequal, joint 1 much larger and more globose; joints 10 to 14 inclusive ovate-oblong; apical joint prolonged into a blunt point. Each of the joints 2-9 inclusive has two large sense organs, which are curved, transparent and on upper surface of joint about 90° apart; other and much smaller sense organs occur near the apex, three or more to each joint; while joints 13 and 14 are fairly covered with minute organs of similar nature. Each joint, except the first, is pubescent and bears a circlet of bristles. Mesonotum dark brown, pruinose, pile brassy; sides of prothorax with a bunch of yellow bristles; pleuræ naked; mesopleuræ white; abdomen black, shining, pile light yellow, reddish in certain lights; venter brown; external genitalia subglobose,

¹ Contributions from the Zoölogical Laboratory of the University of Texas, No. 17.

yellowish white ; legs yellowish brown, strongly infuscated ; knees yellow ; tibiae spurred, outer edge with a row of black lanceolate scales ; bases of tarsi light yellow ; first two joints subequal, the others shorter ; each joint with a graduated row of short bristles on the plantar surface ; empodium strap-shaped, bristly-fringed, nearly as long as claws, claws subequal. Neuration of wings¹ as follows : Costal vein strong, terminating distinctly before the middle of the wing, pilose except for a small naked spot near the base ; third or cubital vein strong, terminating at apex of costal vein, with

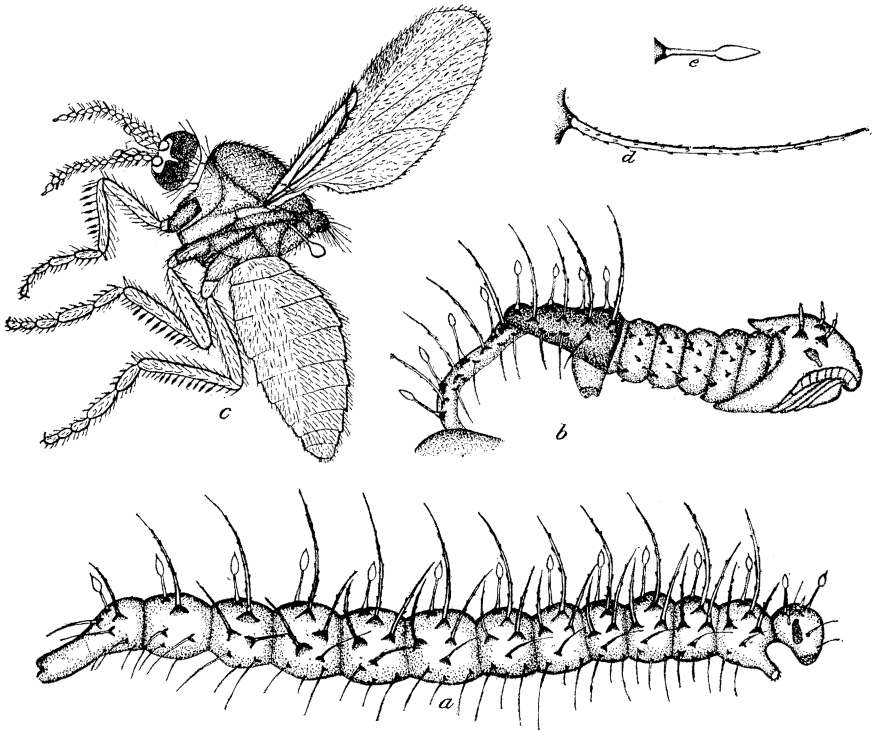


FIG. 1. *Ceratopogon brumalis*. *a*, larva ; *b*, pupa ; *c*, female imago ; *d*, lateral barbellate bristle ; *e*, dorsal ovate-lanceolate bristle.

a strong auxiliary vein extending from upper end of recurrent vein to juncture of costal and cubital veins ; nearly midway between the upper end of recurrent vein and apex of cubital, the latter vein curves forward abruptly till it touches the auxiliary vein, making two loop-like subcostal cells ; the second of which is much the larger ; subcostal vein a mere point of juncture ; recurrent vein strong, making a very obtuse angle with base of median vein, latter strong for the first third of its length, then distinct, but delicate to margin of wing. Discal vein obsolescent before its juncture with the

¹ Nomenclature of neuration of wings after J. Winnertz.

median vein so that no prefurca is visible ; axillary vein distinct from its base to apex terminating in the posterior margin of the wing ; posterior vein short but distinct ; anal veins more or less indistinct, especially near base ; Anterior costal cell long and narrow with apex acute ; subcostal cells loop-like, first very small, often wanting, represented by the line of fusion of the auxiliary and cubital veins ; anterior cubital cell narrow, but enlarged at apex ; second cubital cell with two obsolescent veins which join near base of cell, making a V shaped figure ; between the upper anterior one of these veins and the margin of the wing, the cubital cell is densely pilose, except the small white spot at the juncture of the costal and cubital veins produced

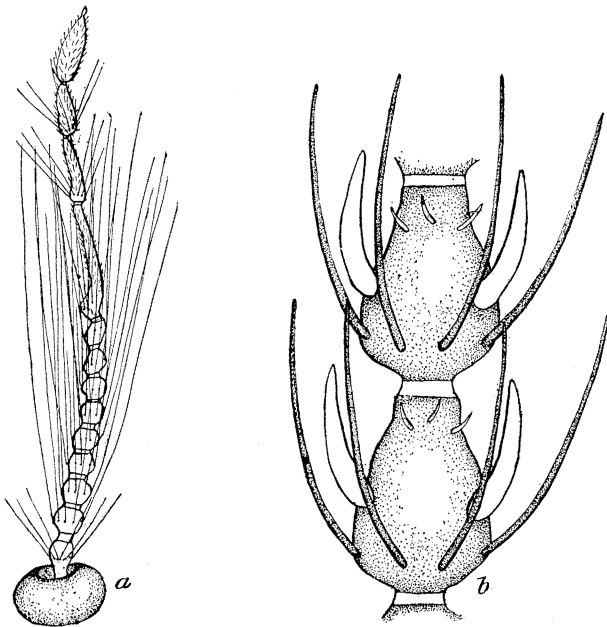


FIG. 2. *Ceratopogon brumalis*. a, male antenna ; b, two joints of female antenna showing sense organs.

by the absence of pile and by the hairs on the contiguous veins being whitish at that point. Two discal cells, subequal with an obsolescent vein in the posterior part of the second parallel with the auxiliary vein.

Coloration of male nearly the same as that of the female : differs from female as follows : Pile on entire insect longer, denser and of a more reddish hue ; the tibiae without the lanceolate scales, metatarsi slightly but distinctly shorter than following joint ; abdomen slender, very pilose, black, slightly longer than wings. The most prominent divergence from female is in the shape and size of the joints of the antennæ ; first joint is much larger than the corresponding joint of the female ; the second somewhat larger but of the same shape, each joint from the third to the tenth spheroidal, becoming

more and more distorted and oblique to the tenth, which is of an irregular oblong shape. Joint 11 is much elongated with the plumosity inserted on an oblique line near base; joints 12-14 much shorter than 11, but longer than any of the basal ten joints. Joints 2, 12 and 13 with a circlet of bristles in place of plumosity; joint 1 naked, 14 without bristles or plumosity but pilose, as are joints 11, 12, and 13 in addition to the plumosity and bristles; joints 3-11 inclusive plumose with a narrow white circlet in front of the insertion of plumosity. Antennary sense organs smaller and straighter than those of the female. Neuration of the male wing practically as in female except that the first subcostal cell is wanting; its place being occupied by the fusion line of the auxiliary and cubital veins; anal veins stronger and more distinct than in female.

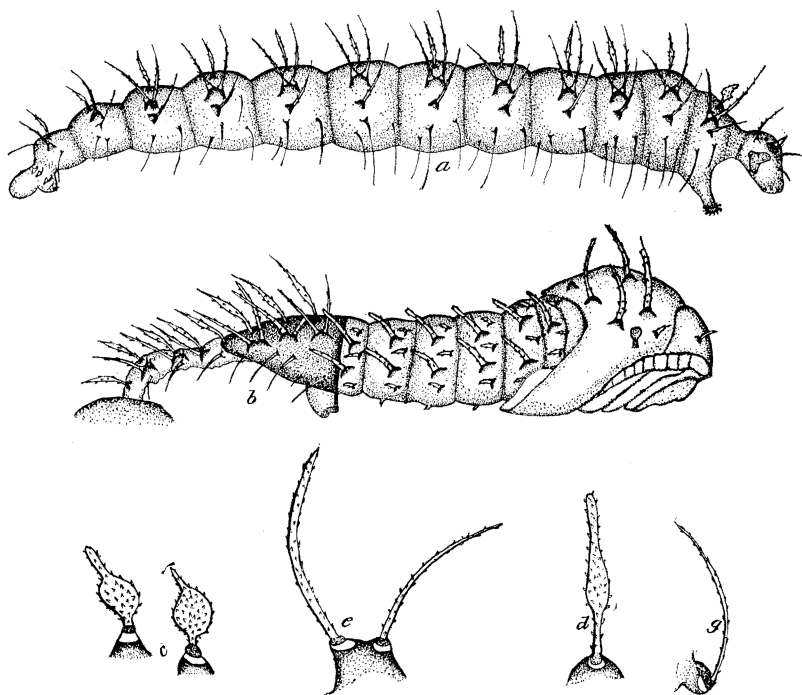


FIG. 3. *C. specularis*. a, larva; b, pupa; c, pair of prothoracic bristles; d, dorsal bristle on remaining segments; e, furcate tubercle with its two bristles; g, small lateral bristle.

Larva: 4-5 mm, long, cylindrical, color dirty white, brownish at the insertion of bristles; head brown, eye spot and mouth parts black. Thoracic legs, .3 mm. long, cylindrical, white, armed at tips with a circlet of black claws; anal feet with two transverse rows of black claws. Chaetotaxy for lateral half of head and body as follows: Head with two ovate-lanceolate hyaline bristles, one in front of, the other behind the

typical head-spine or horn, in addition to several scattered simple bristles. Body minutely pubescent; ovate lanceolate bristles in one dorsal longitudinal row; thoracic pair not enlarged; dorsal bristles smooth, hyaline, bulbous at base. The insertion of the pair on each segment often connected by a transverse black line; 3 longitudinal lateral rows of barbellate bristles inserted below the ovate-lanceolate ones; bristles black, shining, with short and smooth bristles near the ventral surface, the last two segments having only the upper row of these barbellate bristles.

Pupa: 3 mm. long, spinous, light yellow; head darker, obtuse, notched below; thorax with three spines on either side, spines barbellate, anterior one mucronate; stigma spatulate; abdominal spines short, rough, mucronate, in five longitudinal rows on either side; those of rows 1 and 4 larger and longer than the others; there is also a ventral row of very short thick spines. Pupa attached to under surface of dung by the old larval skin.

During November, December and January the larvæ of this species were found in immense numbers on the under side of nearly dry cow dung. They seem to feed on the dung, never penetrating very far into the substance. No eggs were found. The duration of the larval stage seems to be several weeks, that of the pupal stage 7-10 days.

The sense organs on the antennæ of the imagines can be seen only with a high power (500 dia.) and then it is necessary to focus carefully to find them, but once found, they stand out plainly. None of the wings of the males had two subcostal cells and many wings of the females had only one; but in some wings the two cells show plainly. Several hundred larvæ of all ages were found on the under surface of a piece of moist rotting elm wood; similar larvæ and puparia were also found in the nests of the common foraging ant (*Eciton cæcum*) on several different occasions; the author bred imagines from the larvæ taken in these various habitats, and they proved to be the same species. This seems to be a strictly winter species, none of the various stages being found during the warmer months.

CERATOPOGON SPECULARIS Coquillett.

♂, length 2.5 mm., wing 1.5 x .45 mm.; ♀, length 2 mm., wing 1.5 x .6 mm. One subcostal cell, third or cubital vein terminating distinctly before the middle of the wing; with a faint white spot at apex of costa vein; wings and entire insect densely pilose; pile black; halteres white; metatarsi equalling or slightly longer than following joint; antennæ not

longer than mesonotum; tibiæ of the female without lanceolate scales; last four joints of male antennæ longer than basal ten.

♀, head black, both extremities of each segment of the palpi whitish, especially the anterior extremities; central and major portion of each segment black; proboscis with three narrow transverse whitish bands near apex. Pile on antennæ black, whitish at tips; antennæ reaching to about the middle of the mesonotum; joints globose, subequal, the last four being larger and more oblong, especially the apical one, which is prolonged into a short blunt point; basal joint much larger and more globose than the others; sense organs, insertion and position of the pile and bristles on the antennæ as in *C. brumalis*; mesonotum black, shining, pile black; sides of prothorax with a bunch of black bristles; pleuræ naked; mesopleuræ whitish; abdomen black, shining; pile on posterior anal segments dirty white, longer than on other parts, central portion of each segment of venter black; legs black; tarsi distinctly yellow, infuscated at tips, each joint with a graduated row of bristles on the inner plantar surface; empodium

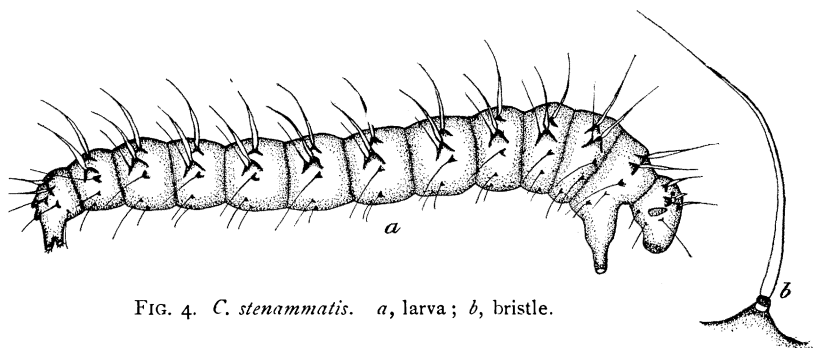


FIG. 4. *C. stenammatis*. a, larva; b, bristle.

strap-shaped, curved, bristly-fringed on convex side; neuration of wings differing from that of *C. brumalis* in the following points: subcostal cell single; only one anal vein; no obsolescent veins in cubital or discal cells; anterior costal cell very narrow; juncture of the veins at base of wings more distinct.

♂ Coloration practically as in female, pile on entire insect longer, denser and more erect than on female; the basal joint of antennæ as usual much enlarged, globose; joints 2–10 inclusive subglobose, graduating in size toward apex and becoming somewhat oblique; joints 11 and 12 much elongated, subequal, tapering somewhat toward apex; joint 13 ovate-oblong, smaller and shorter than the apical one. Plumosity, pilosity and sense organs of antennæ as in *C. brumalis*; also neuration of wings as in female.

Larva: 5–6 mm. long, bristly, and minutely black spinulose; cylindrical, tapering slightly from the metathoracic segment toward base, tapering rapidly toward the head; dirty white. Head dark brown, eye spot and mouth parts black; tips of thoracic feet armed with a circlet

of black claws; anal feet fleshy, armed with two rows of black claws. Chaetotaxy of lateral half of head and body as follows: head ornamented behind with one honey yellow, semitransparent, barbellate bristle, in front of which is a large short simple spine, with white bulbous base, in addition to a few simple bristles. Body with three longitudinal rows of barbellate bristles, dorsal bristles honey yellow, enlarged in center; thoracic pair much enlarged and shorter than the others; the dorso-lateral bristles rise from double tubercles, which are simple on the last two segments; anterior limbs of these tubercles tipped with long honey yellow bristles; those of the posterior limbs short and black; lateral row of small, simple tubercles tipped with dark brown bristles; then subventrally are several scattered simple bristles.

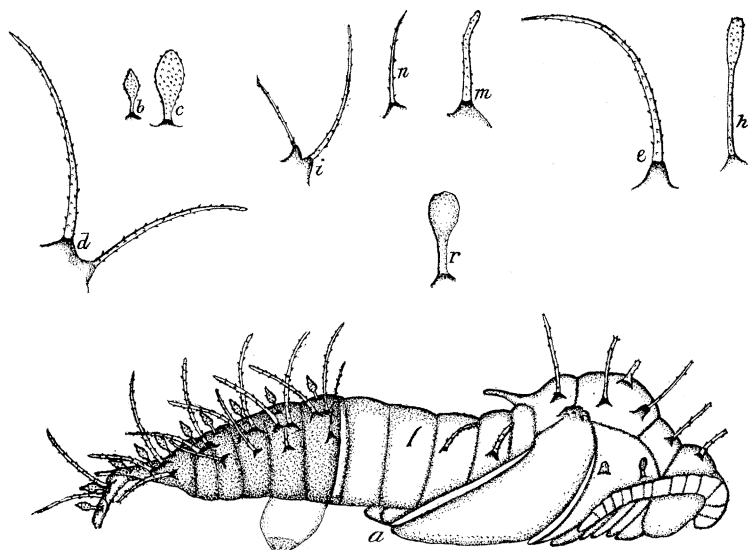


FIG. 5. *C. wheeleri*. a, pupa; b, dorsal bristle; c, enlarged prothoracic dorsal bristle; d, furcate tubercle with its two bristles; e, lateral bristle.

C. texanus. h, dorsal clavate bristle; i, lateral furcate tubercle with its bristles; n, small lateral bristle; m, characteristic spine of pupa; r, thoracic stigma of pupa.

Pupa: 2.5–3 mm. long, pale yellow, head darker. Thorax with four large barbellate spines on each side and several small ones with mucronate tips; anterior abdominal segments which are not incased in larval skin, with five longitudinal rows of barbellate spines; the spines of rows 2 and 4 longer and larger than the others. Ventrally is a row of very short spines with mucronate tips. Anal segment forked with two finger-like bodies at base of furcation. These tips were divergent in life and probably serve to retain the larval skin on the anal segments as the spines are obsolete under this skin. These appendages were observed in all the species of which puparia were seen. Duration of pupal stage 8–10 days.

The larvæ are gregarious and live on the under side of dry cow dung from August to December, but are more abundant during November and December, though not so common as *C. brumalis*. The larvæ of both species are sometimes found under the same piece of dung but usually each species is found alone. This species is described here at length as Mr. Coquilett has given only a brief description of the male.¹

CERATOPOGON STENAMMATIS, sp. nov.

Larva : 5 mm. long, anal segments with two cylindrical feet, tips armed with black claws ; feet .15 mm. long ; thoracic legs .45 mm. long ; color dirty white ; head and mouth parts dark brown. Head with two smooth, short, slightly enlarged bristles, one anterior and the other posterior, to the typical head spine, besides a few scattered simple bristles. Either side of body with two longitudinal rows of elongated setigerous tubercles, the dorsal row with only one hyaline acerose bristle to each tubercle, the lateral row with two bristles to each tubercle, one from apex similar to dorsal bristle, the other simple and of a brownish color and from the posterior side of the tubercle ; there are besides several scattered simple bristles along the ventral and subventral surface.

The specimens were received from Dr. W. M. Wheeler, who found them in the nest of an ant (*Stenamma fulvum* subsp. *aquia*) at Colebrook, Conn., August, 1900. They were moving about in the refuse heaped up by the ants in certain portions of their nests. The species seems to be a genuine myrmecophile like the European species (*C. Braueri* Wasmann).²

CERATOPOGON TEXANUS, sp. nov.

♂, length 2.5 mm. ; wing, 1.3 x .4 mm. ; ♀ length 2 mm., wing 1.35 x .5 mm. ; wings and entire insect densely pilose ; one subcostal cell, third or cubital vein terminating distinctly before the middle of the wing ; no white spot at apex of costal vein ; halteres white ; metatarsi slightly longer than succeeding joint ; tibia of the female without lanceolate scales.

♀, head dark brown, pile brown ; joint 1 of antennæ large globose ; joints 2-10 globose, graduating to globose-ovate, subequal ; joints 11-14 ovate-oblong, apical one larger. Sense organs and arrangement of pile as in *C. brumalis*. Second joint of palpus in female much enlarged. (See Fig. 6.) Mesonotum drab, with short, appressed, light yellow pile, intermixed with some stouter black hairs ; scutellum drab, with several rows of long black hairs ; sides of prothorax with a bunch of hairs ; pleuræ naked,

¹ Vide, "Some New Diptera," *Proceedings of the National Museum*, Vol. XXIII., 1901, p. 601.

² Vide, "Eine myrmecophile Ceratopogen-Larve," *Wiener Entomologische Zeitung*, XII. Jahrg., 8. Heft (10 October, 1893) pp. 277-279.

dirty white, abdominal segments dark brown with dirty white edges producing a banded appearance, which becomes obsolete on the last segments ; pile short, appressed, grayish, becoming longer toward anal segments ; venter dirty white, densely pilose on sides, each segment with long dark pile in front, becoming light yellow behind ; legs dark, pile yellowish and of varying lengths ; tibia of hind legs with a circlet of short spines at apex ; first joint of tarsus slightly shorter than second ; empodium and neuration of wings as in *C. specularis*.

Coloration of male darker throughout than in female ; antennal joints 11-14 inclusive equalling in length the remaining joints ; first joint globose, enlarged ; joints 2-10 depressed globose, graduating in size toward apex and becoming somewhat oblique ; joint 11 much elongated, nearly twice the length of any succeeding joint ; joints 12-14 subequal, apical one slightly larger and more oval-oblong. Pile, plumosity, sense organs, and neuration of wings as in *C. specularis*. Last four segments of abdomen without the whitish edges, blackish, shining, pile denser and longer, without the peculiar pile on venter.

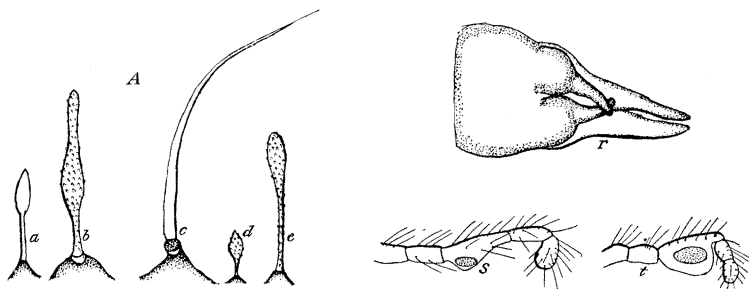


FIG. 6. *A*, characteristic dorsal bristles of each of the five species above described ; *r*, anal segment of the pupa of *C. specularis* ; *s*, palpus of female of *C. brumalis* ; *t*, palpus of female of *C. texanus*.

Larva : Length 5 to 5.5 mm. ; dirty white ; head with two semihyaline bristles ; one in front and the other behind the typical head spine ; chætotaxy for lateral half of body as follows : three longitudinal rows of barbellate bristles ; dorsal bristles hyaline, clavate, minutely tuberculate with segments 5-10 joined at base by a straight black line ; dorso-lateral row of double tubercles, the anterior limbs of which are tipped with curved, semihyaline, broad bristles ; those on posterior limbs short and black ; lateral row of bristles sparsely barbellate, black at base graduating to hyaline at apex ; under the above there are several smaller and subventrally placed simple bristles on each segment ; anal segment with an extra pair of dorsal bristles behind the regular ones. Legs as in *C. brumalis*.

Pupa : 2.5 mm. long, whitish translucent, thorax armed on either side with five yellowish hyaline barbellate spines, the frontal one small with mucronate tip just above and near the base of the antenna. The others on the thoracic dorsum at the corners of a rhomboid ; the anterior spine

truncate with mucronate tip. Stigma black, peduncle semihyaline, the four abdominal segments anterior to the larval skin with three longitudinal rows of spines; those of the dorsal and lateral rows large, hyaline, curved and barbellate, and rising from very prominent tubercles; subventral row of somewhat smaller spines; the tubercles point forward while the spines curve outward and backward. Duration of pupal stage: 7 to 8 days.

The larvæ of this species are gregarious in small numbers beneath the bark of old dead trees in moist places, or on the under side of very damp rotting wood, during December and January. Rare.

CERATOPOGON WHEELERI, sp. nov.

Larva: 5-6 mm. in length; chætotaxy for lateral half of head and body as follows: head with two brown barbellate bristles, one in front, the other behind the typical head spine; besides several scattered simple

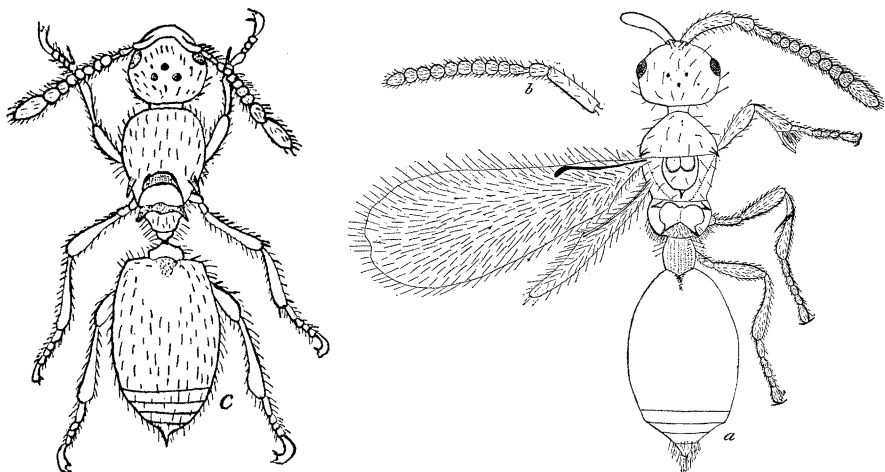


FIG. 7. a, ♀ of *Adeliopria longii*; b, ♂ antenna; c, ♀ of *Solenopsia imitatrix* (redrawn from Wasmann).

bristles; body with three longitudinal rows of barbellate bristles; dorsal row of bristles minutely tuberculate, globose-ovate, hyaline; prothoracic pair much enlarged and more globose; dorso-lateral bristles rise from double tubercles, those on anterior limbs long, light brown and semi-transparent, posterior branches with shorter, jet black bristles; lateral row of small simple tubercles tipped with black shining bristles.

Pupa: 2.5-3 mm. long, head and thorax wine-colored; either side of the thorax with six barbellate spines of varying length and one large tubercle-like spine near stigma, thorax heavily sculptured and minutely spinulose; segments 2 and 3 with a barbellate spine on either side; segment 4 with one small simple spine; other segments unarmed, shining, with small irregular ridges on dorsal portion; anal segment encased in larval skin.

Each of the puparia had been killed by an interesting proto-trypid parasite so that no imagines of this new myrmecophilous *Ceratopogon* could be obtained. A number of these parasites were sent to Mr. Ashmead for identification and proved to represent a new genus of the family Diapriidæ. Through the kindness of Mr. Ashmead, his description of this new genus and species is inserted in this article. By way of illustration figures are included of this new species (*Adeliopria longii* Ashmead) and also of the new and closely related species (*Solenopsia imitatrix*) recently described by Wasmann.¹ The *Ceratopogon* puparia were found December 15, 1900, beneath a stone, in what seemed to be an abandoned ants' nest. The parasites issued, one from the thoracic dorsum of each of the *Ceratopogon* puparia December 31 and lived eight or ten days. This suggests that some of the proctotrupids that have been found in ants' nests and regarded as myrmecophiles may be in reality only parasites of the guests of the ants.

A comparison of the five species above described shows that the larvæ of each have practically the same general size, shape, and color; but the spinous ornamentation is very different, so that they are readily separable by this means alone. In *C. steinammatis* the larvæ differ from the other species in the shape of the anal feet which are cylindrical, short and armed with claws at apex.

The puparia of the Texan *Ceratopogons* also resemble one another very much. Even the differences in spinous ornamentation are not so marked as in the larvæ. The imagines, however, differ in many essential details, especially in coloration and pilosity. The palpi of both sexes of *C. brumalis* and *C. specularis* are similar, but the female of *C. texanus* has the second joint of the palpus much enlarged and the sense organ on it correspondingly increased in size (see Fig. 6, *s* and *t*); the neurulation of the wings of the species is practically identical; the anal extremities of all the puparia which were examined by the writer have the peculiar furcate anal tip and "fingers" described under *C. specularis* (see Fig. 6, *r*). These probably function, as suggested, in holding the old larval skin to the posterior segments of the pupa.

¹ Die psychischen Fähigkeiten der Ameisen, 1899, p. 127 and taf. III., figure 1.

This seems probable also from the fact that the segments encased in the larval skin are smooth, with none of the spines or bristles which appear on the free portions. The tips were observed to be divergent in life but the exact position of the "fingers" could not be determined on account of their being concealed under the larval skin. The dorsal bristles of each of the five species (see Fig. 6, *a*) are the most characteristic and distinguishing features of the larvæ, thus affording a sure and easy means of separating the species. In no case is there any material variation in these bristles for a given species; even when the habitat varies considerably, as in *C. brumalis*, which lives under dung, under rotten wood and in the nests of ants (*Eciton cæcum*), the spinous ornamentation is constant, and the imagines are identical.